

ENGINEERING CHANGE NOTICE

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653815

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	6. Project Title/No./Work Order No. Tank 241-BX-101		7. Bldg./Sys./Fac. No. 241-BX-101	8. Approval Designator N/A
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-ER-408, Rev. 0-D		10. Related ECN No(s). ECNs: 623841, 625691, 640357, 640684	11. Related PO No. N/A
12a. Modification Work <input type="checkbox"/> Yes (fill out Blk. 12b) <input checked="" type="checkbox"/> No (NA Blks. 12b, 12c, 12d)	12b. Work Package No. N/A	12c. Modification Work Complete N/A Design Authority/Cog. Engineer Signature & Date	12d. Restored to Original Condition (Temp. or Standby ECN only) N/A Design Authority/Cog. Engineer Signature & Date	
13a. Description of Change This ECN has been generated in order to update the document to reflect results of recent data/information evaluation. Replace pages: ES-1, ES-2, ES-5, ES-6, 6-1, 6-2, 7-1, and 7-2				
13b. Design Baseline Document? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
14a. Justification (mark one) Criteria Change <input checked="" type="checkbox"/> Design Improvement <input type="checkbox"/> Environmental <input type="checkbox"/> Facility Deactivation <input type="checkbox"/> As-Found <input type="checkbox"/> Facilitate Const <input type="checkbox"/> Const. Error/Omission <input type="checkbox"/> Design Error/Omission <input type="checkbox"/>				
14b. Justification Details A tank characterization report page change revision is required to reflect the results of recent evaluation of data/information pertaining to adequacy of tank sampling for safety screening purposes (Reynolds et al. 1999. Evaluation of Tank Data for Safety Screening, HNF-4217, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington).				
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Tank Characterization Report for Single-Shell Tank 241-BX-101

Juergen H. Rasmussen

Lockheed Martin Hanford Corp., Richland, WA 99352
U.S. Department of Energy Contract 8023764-9-K001


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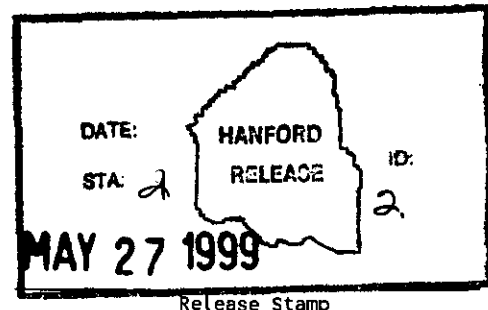
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EXECUTIVE SUMMARY

Single-shell tank 241-BX-101 is an underground storage tank containing high-level radioactive waste. It is located in the BX Tank Farm in the Hanford Site's 200 East Area. The tank was auger-sampled in June of 1994 and vapor space sampled on August 29, 1995. Analysis was performed in accordance with WHC-SD-WM-SP-004, *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). The analysis supports the *Hanford Federal Facility Agreement and Consent Order*, Milestone M-44-08 (Ecology et al. 1994).

Tank 241-BX-101 went into service in 1948 receiving metal waste (produced in the bismuth phosphate process) from B Plant. Other waste types received by the tank during its service life were uranium recovery waste, Plutonium Uranium Extraction (PUREX) Facility cladding waste, evaporator bottoms, B Plant low-level waste, B Plant ion-exchange waste, PUREX organic wash wastes, and Reduction and Oxidation (REDOX) Facility ion-exchange waste.

Tank 241-BX-101 is the first tank in the 241-BX-101, 241-BX-102, 241-BX-103 cascade series. The tank has a capacity of 2,010 kL (530 kgal) and currently contains 163 kL (43 kgal) of waste, existing primarily as sludge, including 3.79 kL (1 kgal) of supernatant. The tank became a suspected leaker in 1973 and was removed from service. The tank was deactivated and the supernatant was pumped, interim stabilizing the tank in 1978. Intrusion prevention was completed in 1981.

The Safety Screening Data Quality Objective (DQO) (Babad and Redus 1994) is the only current DQO that has been applied to tank 241-BX-101. Therefore, only those analyses required by

that DQO were performed in 1994 on the tank auger sample. The analyses included thermogravimetric analysis, differential scanning calorimetry, and total alpha activity. The analyses revealed that the water content in three of the six major subsamples was below the DQO-required limit of 17 wt%, ranging from 11.3 wt% to 16.1 wt% in those three major subsamples. The three subsamples that satisfied the water content requirement ranged from 18.7 wt% to 26.3 wt%. The one subsample that was excluded contained a rock and had a water content of 1.5 wt%. These water content values may pose a safety concern though no exotherms were observed and all of the total alpha results were below the DQO decision limit ($41 \mu\text{Ci/g}$). However, the total alpha results do exceed the transuranic classification criterion (100 nCi/g). The flammability of the gas in the headspace of the tank is another safety screening consideration; no flammable gases were detected in the tank vapor space. Sampling and analyses were sufficient to satisfy safety screening requirements for tank 241-BX-101 (Reynolds et al. 1999).

The current status of tank 241-BX-101 is shown in Table ES-1. A summary of the estimated historical inventory is shown in Table ES-2. The only chemical and radiochemical analytical data for the tank is from a 1976 sampling taken prior to stabilization. These values are based on the historical tank layer model estimates presented in Brevick and Redus (1994).

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6.0 CONCLUSIONS AND RECOMMENDATIONS

The sludge in tank 241-BX-101 was sampled and analyzed in 1976 and in 1994. The vapor space of tank 241-BX-101 was sampled in 1995 for combustible gases. The 1976 results may no longer be accurate because of subsequent salt well pumping and drying effects. Because the 1994 sampling event focused only on safety screening criteria, the chemical and radiochemical compositions of the waste must be estimated from historical information (Brevick et al. 1994). The tank is expected to be mostly sludge with high concentrations of sodium, iron, and uranium phosphate and nitrate. The analysis of 1994 auger samples indicated that the plutonium concentration was well below criticality levels. No exotherms were observed for the DSC analyses. The average percent moisture results for the tank were very near the safety screening criterion of 17 wt%.

The 1994 sampling and analyses sufficiently satisfied the safety screening requirements for tank 241-BX-101 (Reynolds et al. 1999). Subsamples from the lower and upper areas of the auger samples from the two risers were analyzed, however waste recovery for the auger samples was lower than expected. Limited samples and data from different risers and waste depths make it difficult to determine accurately the variability of the waste composition in the tank. Variability for some of the TGA percent water and total alpha results were greater than desired, but did not have a significant impact on the assessment of the data. Historical information on the heat generation and tank temperature records does not indicate that excessive heat is being generated. Data and historical information do not indicate that tank 241-BX-101 has any immediate safety problems. The flammable gas concentration measurement, from August 1995, in the tank vapor space was 0 percent of the lower flammability limit, which satisfies the safety screening criterion.

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